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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.		
10/590,354	08/23/2006	Yusuke Kato	04632.0073	8168		
22852	7590	11/23/2010	EXAMINER			
FINNEGAN, HENDERSON, FARABOW, GARRETT & DUNNER LLP 901 NEW YORK AVENUE, NW WASHINGTON, DC 20001-4413				YOON, KEVINE		
ART UNIT		PAPER NUMBER				
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/590,354	KATO ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	Kevin E. Yoon	1735	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

1) Responsive to communication(s) filed on 09 November 2010.  
 2a) This action is **FINAL**.                    2b) This action is non-final.  
 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

4) Claim(s) 1-13 is/are pending in the application.  
 4a) Of the above claim(s) 8-11 is/are withdrawn from consideration.  
 5) Claim(s) \_\_\_\_\_ is/are allowed.  
 6) Claim(s) 1-7, 12 and 13 is/are rejected.  
 7) Claim(s) \_\_\_\_\_ is/are objected to.  
 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

9) The specification is objected to by the Examiner.  
 10) The drawing(s) filed on \_\_\_\_\_ is/are: a) accepted or b) objected to by the Examiner.  
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
 a) All    b) Some \* c) None of:  
 1. Certified copies of the priority documents have been received.  
 2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

1) <input type="checkbox"/> Notice of References Cited (PTO-892)	4) <input type="checkbox"/> Interview Summary (PTO-413)
2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)	Paper No(s)/Mail Date. _____ .
3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____ .	5) <input type="checkbox"/> Notice of Informal Patent Application
	6) <input type="checkbox"/> Other: _____ .

**DETAILED ACTION**

***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

3. **Claims 1-7 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over applicant's admitted prior art (hereinafter AAPA) in view of Hitachi (JP 53-071627, previously cited).**

**Re Claim 1.** AAPA teaches a casting process comprising the steps of: mixing together one or more kinds of an aggregate granular material, one or more kinds of a binder, to form a mixture of said aggregate granular material (p. 11, lines 3-5, fig. 2, step 11);

charging said mixture into a molding space, and evaporating the moisture within said charged mixture by heating the mixture to harden said charged mixture to mold a mold with said hardened mixture (p. 11, lines 3-5, fig.2, step 12);  
assembling at least one mold made from said hardened mixture and a mating mold to form a completed mold (p. 11, lines 5-6, fig.2, step 13);  
pouring molten metal into said completed mold (p. 11, lines 6-7, fig.2, step 14);  
removing said completed mold from a cast article that is composed of the solidified molten metal during a process of cooling said cast article after said molten metal solidifies (p. 11, lines 7-11, fig.2, step 15-17);  
and applying a heat treatment to said cast article (p. 11, lines 11-12, fig.2, step 18).

AAPA fails to specifically teach that the binder is water-soluble and at least either a polyvinyl alcohol or its derivative, or at least either a starch or its derivative. The AAPA also fails to teach that the aggregate granular material and water-soluble binder are mixed with water and agitating said mixture to cause the mixture to form a foamed mixture.

The invention of Hitachi encompasses molding for casting (Basic abstract). Hitachi teaches to mix sand (an aggregate granular material), PVA (polyvinyl alcohol = binder), and water to form a mold (Basic abstract) because the PVA binder produces a casting with a smooth surface (Basic abstract).

In view of Hitachi, it would have been obvious to one of ordinary skill in the art at the time of invention to modify the invention of AAPA to employ water-soluble binder (PVA) and

water to form a mold; since Hitachi teaches the advantage of using it, which is producing casting with smooth surface (Basic abstract).

Hitachi does not expressly disclose that agitating the mixture to cause the mixture to foam to form a foamed mixture. However, it is inherent to the process of AAPA as modified by Hitachi; since the process and ingredients for mold of AAPA as modified by Hitachi are the same as claimed process and ingredients, mixing the mixture of AAPA as modified by Hitachi will cause it to foam. The examiner is taking this foam mixture to satisfy the claimed foamed mixture.

Regarding “wherein the foamed mixture is charged into the molding surface...”: Since the foamed mixture of AAPA as modified by Hitachi have the same ingredient and produced by the same process as the claimed foamed mixture, charging the foamed mixture of AAPA as modified by Hitachi into the molding surface will also result in the distribution of foam within the aggregate granular material and the moisture content of the binder to concentrate in a center portion of the mold so that after the moisture is evaporated, the center portion of the mold has a lower density of the aggregate granular material than outer portions of the mold.

Regarding “wherein the temperature of the molten metal evaporates or dissolves the water-soluble binder in the mold”: Since the foamed mixture of AAPA as modified by Hitachi have the same ingredient and produced by the same process as the claimed foamed mixture, pouring molten metal into the completed mold of AAPA as modified by Hitachi will also result in evaporation of the water-soluble binder in the mold.

Where the claimed or prior art products are identical or substantially identical, or are produced by identical or substantially identical processes, the burden of proof is on applicant to establish that that prior art product does not necessarily or inherently possess the characteristics of the instantly claimed product. *In re Best*, 562 F.2d 1252, 1255, 195 USPQ 430, 433 (CCPA 1977). See MPEP 2112.01, part I.

**Re Claim 2.** A casting process as recited in claim 1, wherein said at least one mold that is cast in said hardened mixture is a core (p. 11, lines 3-5, fig.2, step 12), and said mating mold is a master mold.

AAPA does not expressly disclose that mating mold is a master mold. However, it is inherent to AAPA; since one mold is core, mating mold is a master mold.

**Re Claim 3.** A casting process as recited in claim 2, wherein said master mold is a metal mold.

AAPA in view of Hitachi fails to specifically teach that master mold is a metal mold. However, it would have been obvious to one of ordinary skill in the art at the time of invention to modify the invention of AAPA in view of Hitachi to utilize metal master mold; since it is easy to reuse.

**Re Claim 4.** A casting process as recited in claim 2, wherein said master mold is a sand mold (Hitachi, Basic abstract).

**Re Claim 5.** A casting process as recited in claim 1, further comprising steps of returning said aggregate granular material, and recovering said returned aggregate granular material (AAPA, p. 11, lines 13-14, fig.2, step 19).

**Re Claim 6.** A casting process as recited in claim 5, further comprising steps of recycling and using said returned and recovered aggregate granular material for molding a mold (figure 2, arrow form step 22 to the top).

**Re Claim 7.** A casting process as recited in claim 5 or 6, wherein said steps of returning and recovering said aggregate granular material are mechanical recovering processes (AAPA, p. 11, lines 15-16, fig.2, step 22).

**Re Claim 12.** A casting process as recited in claim 1, wherein said step of removing said completed mold from said cast article is to apply shales to said mold (AAPA, p.1, lines 6-8 from the bottom).

**4. Claims 1, 12 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over AAPA in view of Hoult (US 4,150,704, previously cited).**

The teachings of AAPA have been discussed above.

**Re Claim 1.** AAPA teaches all the recited limitation (see paragraph 4) except that the binder is water-soluble and at least either a polyvinyl alcohol or its derivative, or at least either a starch or its derivative. The AAPA also fails to teach that the aggregate granular material and

water-soluble binder are mixed with water and agitating said mixture to cause the mixture to and form a foamed mixture.

The invention of Hoult encompasses method of making a mould (abstract). Hoult teaches to use particulate material (an aggregate granular material), water (col. 1, lines 25-32), and starch (col. 1, lines 58-63) to remove fume created during casting (col. 1, lines 58-63).

In view of Hoult, it would have been obvious to one of ordinary skill in the art at the time of invention to modify the invention of AAPA to employ water-soluble binder (starch) and water for mold; since Hoult teaches the advantage of using it, which is removing fume created during casting (col. 1, lines 58-63).

Hoult does not expressly disclose that agitating the mixture cause the mixture to foam to form a foamed mixture. However, it is inherent to the process of AAPA as modified by Hoult; since the process and ingredients for mold of AAPA as modified by Hoult are the same as claimed process and ingredients, mixing the mixture of AAPA as modified by Hoult will cause it to foam. The examiner is taking this foam mixture to satisfy the claimed foamed mixture.

Regarding “wherein the foamed mixture is charged into the molding surface...”: Since the foamed mixture of AAPA as modified by Hoult have the same ingredient and produced by the same process as the claimed foamed mixture, charging the foamed mixture of AAPA as modified by Hoult into the molding surface will also result in the distribution of foam within the aggregate granular material and the moisture content of the binder to concentrate in a center

portion of the mold so that after the moisture is evaporated, the center portion of the mold has a lower density of the aggregate granular material than outer portions of the mold.

Regarding “wherein the temperature of the molten metal evaporates or dissolves the water-soluble binder in the mold”: Since the foamed mixture of AAPA as modified by Hoult have the same ingredient and produced by the same process as the claimed foamed mixture, pouring molten metal into the completed mold of AAPA as modified by Hoult will also result in evaporation of the water-soluble binder in the mold.

Where the claimed or prior art products are identical or substantially identical, or are produced by identical or substantially identical processes, the burden of proof is on applicant to establish that that prior art product does not necessarily or inherently possess the characteristics of the instantly claimed product. *In re Best*, 562 F.2d 1252, 1255, 195 USPQ 430, 433 (CCPA 1977). See MPEP 2112.01, part I.

**Re Claim 12.** A casting process as recited in claim 1, wherein said step of removing said completed mold from said cast article is to apply shakes to said mold (AAPA, p.1, lines 6-8 from the bottom).

**Re Claim 13.** A casting process as recited in claim 12, wherein said step of applying said shakes to said mold includes impact forces at an operating frequency at less than 30 Hz being applied in said mold for less than 30 seconds (AAPA, p.1, lines 6-8 from the bottom), within from 5 to 20 minutes after said molten metal is poured.

AAPA fails to specifically teach to use impact forces of less than 1 MPa. However, it would have been obvious to one of ordinary skill in the art at the time of invention to modify the invention of AAPA in view of Hoult to use impact forces of less than 1 MPa; since the required force would depend on the type of sand mold being used. Therefore, one of ordinary skill in the art would discover the optimum or workable ranges by routine experimentation.

Hoult fails to specifically teach to apply shaking within from 5 to 20 minutes after said molten metal is poured, but teaches to shake as soon as possible after casting, immediately after the metal has solidified (Hoult, col. 3, lines 48-55). It would have been obvious to one of ordinary skill in the art at the time of invention to modify the invention of AAPA in view of Hoult to shake within from 5 to 20 minutes after pouring; since the time range would depend on the metal being cast. Therefore, one of ordinary skill in the art would discover the optimum or workable ranges by routine experimentation.

In the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a prima facie case of obviousness exists. "[A] prior art reference that discloses a range encompassing a somewhat narrower claimed range is sufficient to establish a prima facie case of obviousness." See MPEP 2114.05.

Generally, differences in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical. "[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." See MPEP 2114.05.

***Response to Arguments***

5. Applicant's arguments filed 11/9/10 have been fully considered but they are not persuasive.

On pages 8-10, regarding claim 1, applicant argued that AAPA in view of Hitachi or AAPA in view of Hoult only teaches to mix the ingredients of mixture, and does not teach to agitate the mixture to make it foam to form a foamed mixture. The examiner disagrees with this because: **i) the mixture of AAPA in view of Hitachi or AAPA in view of Hoult has same ingredient as the claimed mixture; ii) the mixing step of AAPA in view of Hitachi or AAPA in view of Hoult inherently includes agitation for the ingredients to mix; iii) since the AAPA in view of Hitachi or AAPA in view of Hoult has the same ingredients and undergoes same process as the claimed process and ingredients, the mixture of AAPA in view of Hitachi or AAPA in view of Hoult would be a foamed mixture.**

On page 9, regarding claim 1, applicant argued that for a foam to be formed in the mixture, something more than simple mixing or agitating the mixture is required. **However, applicant has not claimed nor disclosed any special conditions (for example, speed of mixing (rpm) or duration of mixing) in the specification that are responsible for forming the foam. Since applicant only disclosed that stirring causes the mixture to foam (p. 5/L6-7, p.6/L10-11), and AAPA in view of Hitachi or AAPA in view of Hoult also performs stirring of the mixture, it is the examiner's position that stirring of the mixture of AAPA in view of Hitachi or AAPA in view of Hoult will also causes the mixture to foam.**

***Conclusion***

6. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

The rejections above rely on the references for all the teachings expressed in the text of the references and/or one of ordinary skill in the art would have reasonably understood from the texts. Only specific portions of the texts have been pointed out to emphasize certain aspects of the prior art, however, each reference as a whole should be reviewed in responding to the rejection, since other sections of the same reference and/or various combinations of the cited references may be relied on in future rejections in view of amendments.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin E. Yoon whose telephone number is 571-270-5932. The examiner can normally be reached on Monday-Friday, 9:00 am-6:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jessica L. Ward can be reached on 571-272-1223. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Kevin E. Yoon/  
Examiner, Art Unit 1735

/Jessica L. Ward/  
Supervisory Patent Examiner, Art Unit 1735